**WESTERN NORTH AMERICAN DEFOLIATOR WORKING GROUP MEETING**

**Coeur d' Alene, Idaho**
**October 29-30, 2005**

**picture courtesy of Dave Beckman, IDL, who should also be in the picture**

**our field trip**

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**Participants:** Attendees included 25 representatives from 7 Regions, Canadian Forest Service, and 4 States. See attached list.

## MEETING SUMMARY

**Action Items for 2006:**

**1. Defoliator/Forest Resources Database**

a) Contact Marla at the Forest Health Technology Enterprise Team (FHTET) about ways to make the database accessible, such as Web-based so other people can enter references (Willhite/Bulaon).

b) Send gray literature references related to defoliators and forest resources to Beth (All)

**2. FHP Expertise/ Aerial Application Issue**

Develop a Contingency Plan and send to WNADWG for review. Contingency plan will include: (Ragenovich and ????)

a) Develop a Survey to query Directors on available expertise and interest
b) Prepare letter to Directors to raise awareness of concern of disappearing expertise and interest
c) Identify opportunities for participating in projects such as California, Washington and Eastern U.S.
d) Identify opportunities for enhancing general knowledge of NEPA.
e) Conduct training sessions for project entos
f) Write letter to Rob/Jesus to encourage continuation of Marana-type aerial application of pesticides training

**3. Douglas-fir Tussock Moth Virus Projects (Otvos)**

a) Test egg masses from New Mexico to determine if they are infected with TM-BioControl from 1978 projects or from another strain.
b) Continue to develop virus detection kit for egg masses – (Sheri will submit as an STDP project in fall of 2006).
c) Test egg masses from NM and California populations to determine level of viability, natural virus and parasitism. (Regions will provide funding).
d) Test susceptibility of NM population to TM-BioControl to add to current manuscript –(Iral will discuss with Dick Reardon about).

**4. Other Projects and Things to Do**

- Encourage Bill Schaupp to write up report on tent caterpillar on chokecherry (Costello)
- Continue to follow and document Western Spruce Budworm (WSBW) in hemlock (Randall)
- Write report on western Spruce Budworm Trend Plots (Hostetler)
- Continue to follow and document WSBW plots in thinned and unthinned stands in Montana (Sturdevant)
- Write up DFTM pheromone mating disruption and elution report (Ragenovich)
- Prepare letter on recommendations for DFTM traps for 2006 (Ragenovich)
- Re-evaluate appropriate placement of DFTM EWS trapping plots (All participating Regions)
- Collect adelgids from spruce and send for identification (Beckman)
- Encourage Chris Niwa to publish WSBW trap/defoliation paper (Ragenovich/Overhulser)

**Next Meeting:** TBA but held in October/Early November; Albuquerque, NM - Terry Rogers and Stephani Sandoval for local arrangements.

**Old Business** (action items from 2004 meeting)

1) Continue support of and participation on the TM BioControl-1 ad-hoc committee (completed/ongoing)

2) Coordinate activities associated with testing potential improvements to the DFTM Early Warning System – test new lure holder. Completed: Became a moot point when Pherotech decided not to pursue manufacture of the lure holder.

3) Compile annotated list of published literature, reports, data sets, and other information concerning the effects of defoliators on forest vegetation and subsequent effects on forest resources - Ongoing – see Database Report Summary.

4) Check files in FHP-R4 warehouse for any work on WSBW mating disruption conducted by Julie Weatherby. – Dwight Scarbourough has checked through some of the boxes and has found nothing to date – *Dwight continued to follow up with this after the meeting. Apparently Julie only did work on DFTM mating disruption – not WSBW.* Completed.

5) Communicate feasibility of using WSBW pheromone for mating disruption to Hercon – Completed - John contacted Hercon saying we did not think this a feasible course of action.

6) Contact Chris Niwa to obtain a complete summary of results on work on using WSBW traps to predict defoliation. Completed - Chris provided a draft copy of the paper that has been prepared (authored by Niwa and Overhulser).

7) Communicate to appropriate entities, concern over a declining capability in FHP, especially in the West, to develop and utilize application technologies (Wenz did write letter – additional action by the WNADWG is needed)

## 2005 Defoliator Conditions

**California***: Sheri Smith, Danny Cluck, Dave Schultz, Beverly Bulaon, Laura Merrill and Zach Heath*

California budworm, *Choristoneura carnana californica.*
Defoliation was almost nonexistent on the east side of Trinity Lake (M 261 A).

Silver spotted tiger moth, *Halisodota argentata.*
Light defoliation of Douglas-fir trees of all sizes was visible in early June near Haylock Gulch, west of Trinity Lake. (M261A).

Mylitta crescent, *Phyciodes mylitta.*
There was a mass flight of adult Mylitta crescent butterflies over the summit of Mt. Lassen in Lassen Volcanic National Park on August 6 (M261D). The larvae feed on thistles.

White-lined sphinx, *Hyles lineata*
Larvae of the white-lined sphinx were reported from several areas on the Lassen National Forest during the summer of 2005 (M261D, M261E). The larval stage feeds on a great diversity of plants including willow weed (*Epilobium*), four o'clock (*Mirabilis*), apple (*Malus*), evening primrose (*Oenothera*), elm (*Ulmus*), grape (*Vitis*), tomato (*Lycopersicon*), purslane (*Portulaca*), and *Fuschia*.

Pine needle sheathminer, *Zelleria haimbachi*.
A small amount of pine needle sheathminer defoliation was seen in a ponderosa pine plantation in the old Haystack Burn on the Klamath NF (M261A).

Pandora moth, *Coloradia pandora*.
Adults of the pandora moth were attracted to lights in Yreka, Siskiyou County (M261A). A survey of ponderosa pines in the area did not detect any trees with obvious signs of feeding.

California tortoise-shell, *Nymphalis californica*
California tortoise-shell butterfly larvae were observed on Fredonyer Peak, north of Eagle Lake, Lassen County, defoliating snowbrush (*Ceanothus velutinus*). Large numbers of migrating adults were observed later in the summer on the Eagle Lake Ranger District, Lassen National Forest. (M261D)

Unkonown oak leaf skeletonizer
Feeding injury was observed on black oak (*Quercus kelloggii*) at a few locations on the Lassen, Plumas and Tahoe National Forests. Areas with the highest damage levels included a 10 acre stand near Monterey Point, southwest of Turner Mountain, Almanor Ranger District, Lassen National Forest (M261D), along the Foresthill Road, Foresthill, Placer County, along the Interstate 80 corridor from Colfax to Emigrant Gap, Tahoe National Forest and along Schneider Creek towards Third Water Creek, Mt. Hough Ranger District, Plumas National Forests. (M261E)

Modoc budworm, *Choristoneura viridis*
A small area of defoliated white fir was observed just east of Bald Mountain (T43N, R15E, Sec.10). Defoliation has likely occurred here over the past couple of years based on observed crown conditions. During elevated periods of fir engraver activity, *Scolytus ventralis*, Modoc budworm defoliation is often masked.

Douglas-fir tussock moth, *Orgyia psuedotsugata*
See following report for information of 2005 larval sampling results.
Results of 2005 larval surveys for Douglas-fir tussock moth (FHP Report # NE05-07).

Number of plots by estimated midcrown density of larvae/$1000^2$ inches of foliage.

| **Forest** | *** M <2 larval density** | *** M = 2-19 larval density** | ***M >20 larval density** |
|---|---|---|---|
| BLM | 5 | | |
| Modoc NF | 2 | 4 | |
| Sequoia NF | 5 | 6 | |
| Sequoia-Kings Canyon NP | 7 | | |
| Sierra NF | 6 | 6 | 1 |

| | | | |
|---|---|---|---|
| Stanislaus NF | 8 | 1 | |
| Tahoe NF | 5 | 5 | |
| Yosemite NP | 2 | 5 | 1 |

*** M = Estimated midcrown density of larvae/per 1000$^2$ inches of foliage.**

Douglas-fir tussock moth trap catches continued to increase in many locations in northeastern California in 2004 but subsequent larval sampling in 2005 indicated that most populations were at least a year away from potential outbreak levels. Areas with larval densities approaching outbreak levels were found on the Modoc National Forest (3 locations on the Big Valley Ranger District), Plumas National Forest (1 location on the Mt. Hough Ranger District) and Tahoe National Forest (4 locations on the Yuba River Ranger District and 1 location on the American River Ranger District). No defoliation has been observed at any of these sites. Large numbers of larvae were readily observed near the Secret House campground on the Foresthill Divide Road, American River Ranger District, Tahoe National Forest. (M261E)

In the southern Sierra Nevada range, Douglas fir-tussock moth defoliation was reported from some locations. 2005 aerial surveys detected the following number of acres of DFTM defoliation. To date, Yosemite NP is the only Forest/Park proposing a treatment.

| **Forest** | **Ranger District** | **Acres of defoliation** |
|---|---|---|
| Stanislaus NF | Mi-Wuk | 1,448 |
| | Summit | 801 |
| Sierra NF | Mariposa | 4,519 |
| | Minarets | 3,850 |
| Yosemite NP | | 2,093 |
| | Total for 2005 | 12,711 |

Jeffrey pine needleminer, *Coleotechnites sp. near milleri*
The Jeffrey pine needleminer continued to infest trees in Truckee, Placer County, California. Approximately 200 acres were affected in 2005, which is about a third of the area affected in 2004. The area has also shifted and is now entirely to the south of Interstate 80. (M261E)

Lodgepole pine needleminer, *Coleotechnites milleri*
The lodgepole pine needleminer outbreak in Yosemite National Park that began with the 1992 to 1994 generation continued with low to high levels of defoliation and low mortality in 2005 (M261E). Aerial surveys delimited a total of 31,030 acres of defoliation.

Fruittree leafroller, *Archips argyrospilus*
There's an outbreak of *Archips argyrospila* (Walker) on *Quercus kelloggii* over approximately 1,200 acres on Palomar Mountain, Cleveland National Forest, in San Diego County. The defoliation was not captured in the annual aerial mortality survey, perhaps because the trees had partially refoliated by the time of the flight in August.

*Exotics*
Asian Gypsy Moth, *Lymantria dispar*
There were two Asian Gyspy moth finds in California during 2005. One moth was found in San Pedro, Los Angeles County (Asian G.M. Mitotype) and the other in Santa Ana, Orange County (Siberian Mitotype). These two detections and the one moth trapped on July 9, 2003 at Wilmington are considered to be three separate unrelated events. The San Pedro moth is Asian, the one from Santa Ana is Siberian, therefore, these moths represent separate introductions. The Wilmington find has the Asian Mitotype as does the one trapped in San Pedro. The latter find was made 2 miles from the Wilmington detection, the find area has been trapped for two seasons at 25/mi $^2$. The probability of a viable population of 100 male moths remaining undetected during this time is ~= $1.26x10^{-4}$. The California Department of Food and Agriculture will continue to trap at a minimum of 100+ traps in the core and 25 traps/ mi$^2$ within a 5 mile radius of all three finds. Traps will remain in the field through October. No treatments are currently planned for 2006.

**Oregon**: *Prepared by Dave Overhulser, Oregon Dept. of Forestry*

Western Spruce Budworm, *Choristoneura occidentalis*
In 2005 western spruce budworm defoliation was detected on 154 acres. This is a significant drop from the 6,493 acres detected in 2004. Most of the budworm detections over the last several years have been on the southern half of the Malheur National Forest in Central Oregon.

Spruce Aphid, *Elatobium abietinum*
A significant spruce aphid outbreak occurred along the Oregon coast in Sitka spruce during 2005. Approximately 4,782 acres of defoliation were detected and the aphid populations benefited from very warm winter conditions. Yellowing needles were observed in early May, more than a month earlier than most outbreak years.

Larch Casebearer, *Coleophora laricella*
Defoliation by larch casebearer was virtually absent in Oregon from the early 1980's to 1998. Starting in 1999, larch casebearer defoliation has been mapped every year somewhere in eastern Oregon. In 2005, 2,533 acres of western larch defoliation were detected, a substantial decrease from the 6,324 acres detected in 2004.

Sawflies –*Neodiprion abietis* complex (balsam fir sawfly)
There were several reports of sawflies defoliating Douglas-fir plantations around the periphery of the Willamette Valley. Defoliation was concentrated in the lower crowns of trees. This maybe the first recorded outbreak of this defoliator in Oregon...

Balsam Woolly Adelgid, *Adelges picae*
Declining sub-alpine fir stands were detected on 76,655 acres in 2005, an increase from the 57,882 acres mapped in 2002.

Pandora Moth, *Coloradia pandora*
This was the off year for defoliation from the current Pandora moth outbreak affecting lodgepole pine stands in northern Klamath County. Whether this outbreak has collapsed or continues will become apparent in the spring of 2006. Defoliation in 2004 grew to 87,521 acres, much of it highly visible along the HWY 97 corridor.

**Washington:** *Prepared by Karen Ripley, Washington Department of Natural Resources*

Western spruce budworm, *Choristoneura occidentalis*

"Defoliating Insect Activity in Washington State 2005" (handout provided) shows that western spruce budworm (WSB) activity is present through much of the east slopes of the Cascade Mountains (the green band that extends lengthwise down the middle of the state, with the crest indicated by an irregular line of county borders) north of the Yakama Indian Reservation (YIR) and in far northeast Washington near the Idaho border. Although there was a 20+ year WSB outbreak associated with the YIR and southeast Cascades, activity in those areas has diminished. Some sites just north of the YIR have endured 7-10 years of defoliation, but most other sites in Washington have only been affected for 2-3 years.

WSB pheromone trapping has been conducted throughout much of the eastern Cascades. Although only a small amount of data is available, we do not expect widespread activity in northeast Washington (Ferry, Stevens Counties). Significant defoliation is expected to continue throughout the east Cascades. A few spots in the southeast Cascades still have potentially damaging populations of WSB.

Many of the WSB affected stands are crowded with Douglas-fir and grand fir, with pine at lower than historic levels due to fire suppression, logging practices and loss of white pine. Balsam woolly adelgid (*Adelges picea*), a fairly new presence in the east Cascades, may also be an important contributor to duration of the outbreaks and damage sustained by grand fir.

Spruce aphid, *Elatobium abietinum*
Spruce aphid defoliated coastal Sitka spruce stands. Spruce aphids damage the old foliage causing needle loss. Open-grown trees are most noticeably affected. High aphid populations are associated with mild winter temperatures. Additional foliage damage to spruce was likely caused by a freak hot spell of 90° weather in late May during foliage elongation.

Hemlock looper, *Lambdina fiscellaria lugubrosa*
Hemlock looper damage was noted in Skagit County. This is near the area where we toured with the 2002 Defoliator Work Meeting participants. Although the looper outbreak has mostly subsided, affected hemlock continues to die due to secondary causes, exacerbated by drought.

Douglas-fir tussock moth, *Orygia pseudotsugata*
No Douglas-fir tussock moth defoliation polygons were identified in 2005. Of nearly 180 pheromone trap plots monitored by DNR in 2005, 86% caught one or fewer moths per trap. Only 3 sites (Palmer Lake, Okanogan County, 28.4 moths per trap; Keller Ferry, Lincoln County, 26 moths per trap; and Dusty Mtn Meadows, Okanogan County, 17.8 moths per trap) had more than 10 moths per trap. These sites are distant from each other and the Palmer Lake site commonly "cries wolf" as a high outlier. Additional attention may be given to these areas in spring, 2006, depending on data provided by other trapping agencies.

Western tent caterpillar, *Malacosoma californicum*
A three-year western tent caterpillar outbreak in urban and suburban areas of central Puget Sound (Seattle, Whidbey Island, Vashon Island, Poulsbo) has collapsed. The caterpillars were a major nuisance to homeowners. Red alder sustained severe topkill and mortality. Although alder is thought to be resilient to tent caterpillar feeding, the drought years and defoliation were too much.

**Idaho:** *prepared by David Beckman and Dwight Scarborough*

Douglas-fir Tussock Moth, *Orygia pseudotsugata*
For 2004, there were 692 acres reported for Douglas-fir tussock moth defoliation on the Sawtooth NF.

Western spruce budworm, *Choristoneura occidentalis*
For 2004, there were 2076 acres defoliated by western spruce budworm on the Boise NF.
For 2004, there were 2631 acres defoliated by western spruce budworm on the Payette NF.
For 2004, there were 718 acres defoliated by western spruce budworm on the Salmon-Challis NF.
For 2004, there were 2393 acres defoliated by western spruce budworm on the Sawtooth NF.
For 2004, there were 2961 acres defoliated by western spruce budworm on the Targhee NF.

Gypsy Moth, *Lymantria dispar*
There were no gypsy moths trapped in southern Idaho. Of the total number of traps placed for the state of Idaho, 440 traps were placed by the Boise Field Office in souther Idaho.

Forest tent caterpillar, *Malacosoma disstria*
No notable forest tent caterpillar defoliation reported for 2004 or 2005.

Balsam Woolly Adelgid, *Adelges picea*
BWA was observed in the McCall, ID area on the Payette National Forest.

**Montana:** *prepared by Nancy Sturdevant, Missoula Service Center*

In 2005, number of acres defoliated by budworm increased from 2004. In 2004, acres that were flown and mapped with defoliation was about 187,000, of which 177,000 was from western spruce budworm. Due to the unpredictable and inclement weather conditions during the survey period in 2004, acreage figures for defoliation were an underestimate. The number of acres defoliated by budworm in 2005 not only increased in extent, but, also in intensity. In 2005, we recorded very heavy defoliation on Douglas-fir on the Helena and Gallatin National Forests. We also recorded areas of defoliation from budworm that had never been recorded via aerial survey. In 2005, we also recorded localized defoliation from an "unidentified defoliator" near Spar Lake on the Kootenai NF. We suspect that this defoliation was caused by either spruce budworm or hemlock looper. On-going Douglas-fir tussock moth monitoring efforts conducted by DNRC, correctly forecasted a populations surge in 2004. In 2004, over 5,800 acres were damaged by tussock moth this year in the Flathead Indian Reservation alone. In 2005, the population collapsed and few small polygons of defoliation from tussock moth were recorded.

Other defoliators were more localized per forest, with minimal acres detected. No gypsy moths were found in monitoring traps in the state of Montana.

**Utah:** *prepared by Darren Blackford, presented by Ben Myerson*

Douglas-fir Tussock Moth (*Orgyia pseudotsugata* (McDunnough))
For 2004 and 2005, there were no notable acres of Douglas-fir tussock moth defoliation reported. There were no traps placed for these two years.

Western Spruce Budworm (*Choristoneura occidentalis* Freeman)
There were a total of 14,861 acres defoliated on the Dixie NF in 2004. This number has increased significantly from the 2003 (8966 acres) and 2002 (3747 acres). This is the largest infestation reported in Region 4. For 2005, there appears to be a significant increase in infested acreage, with a preliminary estimate of ~25,000 acres reported.

There were 248 acres defoliated on the Uinta NF in 2004. This is a similar acreage reported in 2003 (200 acres) and 2002 (300 acres). For 2005, preliminary estimates of infested acreage appear to be the similar to 2004 figures.

There were 613 acres defoliated on the Manti-La Sal NF in 2004. For 2005, preliminary estimates of infested acreage appear to be the similar to 2004 figures.

In 2004, there were 2,467 defoliated acres detected on the Fishlake NF. This is a slight decrease from 2003 (3,087 acres) and increase from 2002 (1,792 acres). For 2005, preliminary estimates of infested acreage appear to be the similar to 2004 figures.

Gypsy Moth (*Lymantria dispar* (Linnaeus))
In 2004, a total of about 3,400 gypsy moth traps were placed statewide by state and federal crews, and collecting a total of 3 moths in northern Utah. There were no moths caught in 2005.

Forest Tent Caterpillar (*Malacosoma spp*.)
In 2004, there were 1,327 defoliated acres detected on the Dixie NF, 1,365 acres on the Uinta NF, and 1,522 acres on the Wasatch-Cache NF. This is significantly more than 2003 (100 acres) and 2002 (0 acres). There were 7,034 defoliated acres detected on private lands in 2004. Caution: Recent ground-truthing surveys suggest that some of the 2004 estimates on FTC defoliation was in fact aspen decline. For 2005, there were no FTC acres reported.

Miscellaneous Agents -Aspen Decline**.**
As previously mentioned, there were several acres reported as FTC defoliated acres in 2004 that were in fact aspen decline acres. For 2005, there were ~20,000 acres of aspen decline estimated for the Caribou NF, ~1800 estimated for the Fishlake NF, ~7000 acres estimated for the Dixie NF, and ~200 acres estimated for the Manti-La Sal NF

**Nevada:** *prepared by Darren Blackford, presented by Ben Myerson*

Douglas-fir tussock moth, *Orgyia pseudotsugata*
In 2004, there were 3,720 acres infested (1802-heavily infested, 1918-lightly infested) on the Humboldt-Toiyabe NF. This is a decrease from 2003 (7,700 acres) and an increase from 2002 (800 acres). There were no traps placed for 2004. For 2005, there were 15 traps placed on the Humboldt-Toiyabe NF in Western Nevada. There were no moths caught. Data for 2005 infestation levels are not available at this time.

Western spruce budworm, *Choristoneura occidentalis*
No notable western spruce budworm defoliation was detected for 2004. There was also none reported for 2002 or 2003. Data for 2005 infestation levels are not available at this time.

Gypsy moth, *Lymantira dispar*
In 2004 and 2005, there were ~450 gypsy moth traps placed statewide with no moths caught.

Forest tent caterpillar, *Malacosoma disstria*
There were no defoliated acres reported for 2004. Data for 2005 infestation levels are not available at this time.

**New Mexico:** *prepared by Terry Rogers, Albuquerque Service Center*

Western tent caterpillar, *Malacosoma californicum*
Aspen defoliation, caused by the western tent caterpillar, was extremely heavy and wide spread throughout the aspen stands in northern New Mexico. Aspen defoliation mapped in 2005 totaled 35,800 acres compared to 25,385 acres in 2004.

Western Spruce Budworm *Choristoneura occidentalis*
Western spruce budworm defoliation in New Mexico mixed conifer forests decrease from 23,185 acres in 2004 to 183, 765 acres in 2005. Fir looper defoliation in the Sacramento Mountains in southern New Mexico remained relatively unchanged totaling 5,295 acres in 2005 compared to 5,915 acres in 2004. The fir looper defoliation mapped in 2005, however, may actually represent tree mortality from past looper defoliation, since ground examinations revealed only minor caterpillar activity and current years defoliation.

Douglas-fir tussock moth, *Orygia pseudotsugata*
In central New Mexico, the Douglas fir tussock moth (DFTM) is currently at outbreak levels on the Sandia Mountains, Cibola National Forest. Larvae and egg masses were collected from the infestation area in June and October, respectively, to be tested for virus. The larvae and egg masses were sent to Imre Otvos, Pacific Forestry Center, BC, Canada for testing. The DFTM outbreak occurring on the west side of the Sandia Mountains is in its third year. This outbreak was first detected on the Cibola National Forestin 2004 on approximately 295 acres of host type. In 2005, DFTM defoliation increase to 870 acres. Larval population densities in 2005 were extremely heavy resulting in significant tree mortality. An area of DFTM defoliation located in a wilderness area was also detected on the east side of the Sandia Mountains. This outbreak is currently in year two of its cycle and is expected to increase again in 2006.

**Colorado:** *prepared by Sheryl Costello*

Douglas-fir Tussock Moth, *Orygia pseudotsugata*
Pike National Forest, Rampart Range (Northwest of Colorado Springs)
Early Warning Pheromone System: Three out of nine trap sets caught 15, 10, and 4 moths. Not more than 3 moths have been caught since 2000.

US 285 SW of Denver
Approximately 100 Douglas-fir tussock moth larvae and pupal cases were collected from Douglas-fir and reared out for parasites. Two flies and three wasps were identified using Torgersen 1977. These included: *Agria housei* and *Carcelia yalensis* (Diptera), *Theronia atalantae fulvenscens*, *Iseropus stercorator orgyiae*, and *Bracon xanthonotus* (Hymenoptera).

Western Spruce Budworm, *Choristoneura occidentalis*

White River National Forest (Central CO)
Chronic budworm in both Douglas-fir and subalpine fir.
West of Boulder, CO
New patches detected in Douglas-fir this year.
Front Range populations maybe in a building phase.
Rio Grand National Forest (East of Wolf Creek Pass, Southern CO)
Chronic budworm in Douglas-fir.
Uncompahgre National Forest (Southern CO)
Budworm in both subalpine-fir and Engelmann spruce, outbreak lasting several years, some stands heavily impacted, but these areas are not extensive.
San Juan National Forest (Southern CO)
Budworm in both subalpine-fir and white-fir. Again, fairly long-term infestations in areas where WSBW appears to be chronic.

Other Defoliators:
San Isabel NF (near Cuchara)
Low to medium levels of western tent caterpillar, *Malacosoma californicum*, on USFS and private lands. While levels have not been particularly high, there has been some local concern.
San Isabel and San Juan NFs (extreme southern portions)
Tiger moth larvae defoliated ponderosa pine tops. The caterpillars created conspicuous "tents" while feeding in the tops of affected trees. No samples were obtained, but verbal descriptions were probably *Halisidota ingens*.

**South Dakota:** *prepared by Sheryl Costello*

Gypsy moth, *Lymantria dispar*
Black Hills National Forest, SD -One Gypsy moth caught in traps around Mount Rushmore.

Tent Caterpillar, *Malacosoma spp*
Heavy tent caterpillar defoliation on Choke Cherry for approximately 5 years on the Crow Creek Indian Reservation caused trees not to fruit. The fruits are used as a food source and have cultural significance.

**Nebraska**

Pine Tussock Moth, *Parorgyia grisefacta*
Wildcat Hills, NE (Southeast NE, near Scottsbluff) - Pine tussock moth population has collapsed.

**Wyoming:** *western Wyoming prepared by Darren Blackford, presented by Ben Myerson; eastern Wyoming prepared by Sheryl Costello*

Douglas-fir tussock moth, *Orgyia pseudotsugata*
Western Wyoming. For 2004 and 2005, there were no notable Douglas-fir tussock moth defoliation reported. There were no traps placed in 2004 or 2005.

Western spruce budworm, *Choristoneura occidentalis*
No notable defoliation was detected for 2004 in western Wyoming. This is a decrease from 2003 acres (1,600 acres). For 2005, there were no notable acres reported.

Medicine Bow NF (South-Central WY) -Chronic budworm populations.
Bighorn and Shoshone National Forests (Northern WY)-Probably low levels of western spruce budworm, but aerial survey has not been ground checked (some possibly in Shell canyon, some near Yellowstone).

Gypsy moth, *Lymantria dispar*
In 2004, there were ~40 traps placed in western Wyoming, trapping 1 moth outside of Jackson, WY. In 2005, there were another 40 traps placed with no moths trapped.

Other Insects
No notable forest tent caterpillar defoliation reported for 2004 or 2005.

**Alaska:** *prepared by Jim Kruse, Fairbanks Service Center*

Spruce Budworm; *Choristoneura fumiferana* (Clemens)
Aerial surveys mapped 15,968 acres of spruce budworm defoliation in 2005. In 2004, indications were that an outbreak had begun as over 83,000 acres of spruce in interior Alaska were defoliated. Damage was concentrated along the hills and ridges around Fairbanks (Nenana Ridge, Parks Ridge, Chena Ridge) and west along the Tanana River. The decreased acreage mapped in 2005 can be attributed to several factors. Drought damage, light conditions on the day of survey, and large cone crops made it difficult to pin point actual spruce budworm damage. Additionally, 44,081 acres (more than 50% of what was mapped in 2004) that were infested along the Yukon River in the Lower Birch Creek area were not flown during aerial surveys in 2005 as part of that acreage had burned in forest fires during 2004 and 2005. Ground surveys indicated that populations of spruce budworm are still expanding and that the outbreak will continue to intensify along the ridges. Defoliation of white spruce tops was observed on as much 5-10 feet resulting in some top kill. Flight trap numbers (capturing adult moths) also increased in 2005. Current research is evaluating the efficacy of spruce budworm larvae in outbreak conditions as a mortality agent of white spruce regeneration, and quantifying the effects of spruce budworm damage of white spruce regeneration. Results should be available during the winter of 2006/7.

Larch Sawfly; *Pristiphora erichsonii* (Hartig)
Larch sawfly defoliation increased slightly from 14,215 acres in 2004 to 16,771 acres in 2005. Nearly 80% of the infested acreage, 13,085 acres, occurred along the Kuskokwim River between McGrath and Sleetmute, and along the Holitna River south of Sleetmute. Larch sawfly continues to be a problem on ornamental larch in urban areas of south central Alaska.
A study has been initiated to (1) refine the distribution map of larch in Alaska; (2) map the location of healthy larch stands across the distribution of the species; (3) map the larch sawfly infestation in areas not previously covered during annual aerial pest detection surveys; (4) Provide information necessary for making the determination whether to proceed with a genetic conservation program for larch. This study is expected to be completed during the winter of 2007/2008.

Aspen Leaf Miner; *Phyllocnistis populiella* Chambers
Aspen leaf miner infestations increased for a fifth consecutive year. In 2005, 659,536 acres were mapped by aerial surveys. The two years previous infestations were recorded as 584,405 and 351,058 acres, respectively. The current outbreak continues to expand and intensify in the interior hardwoods surrounding Fairbanks. The infestation extends northeast to the Alaska/Yukon border through the Yukon River Valley where over 200,000 acres were mapped, and southeast to the Alaska/Yukon border along the Tanana River drainage. With the exception of a few localized outbreaks found in south-central Alaska and those spread sporadically across the west of the state, the majority of the outbreak is bounded by the Alaska Range to the south and the Brooks Range to the North.

Willow Leaf Blotch Miner; *Micrurapteryx salicifolliela* (Chambers)
In 2005, 44,538 acres of willow defoliation/leaf miner were recorded. This is a decrease from 81,600 acres recorded in 2004. The bulk of this activity was concentrated in the vicinity of Fort Yukon, but noticeable activity was recorded throughout the Interior, as far south and west as the mouth of the Yukon and Kuskokwim Rivers, east to Chitina, and in the vicinity of Yakutat. Historically it has been difficult to predict the outcome of willow leaf miner outbreaks. Though never quantified, considerable willow mortality had been noted in the Yukon Flats NWR following five years of heavy leaf mining activity during the 1990s.

Miscellaneous Defoliators
Several areas of defoliation by less often noted pests were documented this year. Conifer defoliation totaling 45,273 acres was observed in two major areas in 2005. About one third of the total was scattered around Prince William Sound. The majority was found around eastern Norton Sound in northwestern Alaska, concentrated to the north of Norton Bay between Elim and Koyuk. While efforts will be made to identify these pests in 2006, spruce sawfly is a suspect. Nearly 13,000 acres of alder were defoliated in the Anchorage bowl, presumably by one or more alder sawfly species. Over 4,200 acres of alder leaf roller were also recorded in the Anchorage bowl. On the rise, over 10,000 acres of defoliated birch in the Interior and South-central were evident; possible culprits include

the spear-marked black moth and the rusty tussock moth. A small (276 acres) area east of Talkeetna was affected by spruce/larch budmoth.

Gypsy Moth; *Lymantria dispar* (L.)
One male European gypsy moth was trapped at the Tanana Campground in Fairbanks in 2004, but nothing additional despite intensive trapping in the area for 2005. Previously, only two European gypsy moths have been trapped in Alaska. As far as is known, populations of the gypsy moth have not been established in Alaska.

European Pine Shoot Moth; *Rhyacionia buoliana* (Denis & Schiff.)
The European pine shoot moth was discovered for the first time in 2004 in new landscape plantings of Scotch pine (*Pinus sylvestris*). The trees were imported from Idaho and planted in a new road construction project in Anchorage. Infested terminal shoots and leaders were removed and the trees were sprayed with Carbaryl. There were no indications of this introduced shoot moth in 2005.

Amber-Marked Birch Leaf Miner; *Profenusa thomsoni* (Konow)
More than 30,500 acres of defoliated birch were mapped during aerial surveys in 2005. The high of 138,000 acres in 2004 is attributed to the record warm, dry 2004 summer which favored leaf miner reproduction and dispersal, as well as a concentrated ground survey effort that was not repeated in 2005. The summer of 2005 was far wetter early on, perhaps reducing or at least restraining the spread of the miner.
Large leaf miner populations are known as far south as Bird Ridge; approximately 30 miles south of Anchorage, Soldotna on the Kenai Peninsula, Talkeetna (Parks Highway), and Pinnacle Mtn. (Glenn Highway). It has been recorded from southeast Alaska near Haines and Skagway, and was also accidentally introduced into the Fairbanks area, probably through repeated introductions via nursery/landscape birch stock from the Anchorage area. Amber-marked birch leaf miner damage has been observed on and around Eielson Air Force Base, the town of North Pole, the city of Fairbanks, and Fort Wainwright Army Base. On Eielson AFB in 2004, evidence was discovered that proved that the amber-marked birch leaf miner could complete development within the much smaller leaves of dwarf birch (probably *Betula glandulosa*).

European Yellow Underwing Moth; *Noctua pronuba* L.
The European yellow underwing moth was discovered in numbers in Haines, AK in early September. It is the first record of this well known European pest in Alaska. It was introduced in Nova Scotia in 1979, and has been rapidly spreading across the continent ever since. Based on the rapid movement of this species, it is likely to be found in the Mat-Su valley in the next couple of years, and will be quite numerous throughout most areas of Alaska by 2010. Its final distribution will likely be throughout southeast, south-central, and interior Alaska as far north as the Brooks Range. It has been recorded in tundra around northwestern Hudson's Bay.

The European yellow underwing is largely an agricultural pest. The larvae are generalist feeders and have been recorded on grasses, dock and dandylions, and a wide range of wild and cultivated herbaceous plants. They also attack, tomato, potato, carrot, beet,

lettuce, grape, and strawberry, and are pests on garden flowers. In British Columbia, where this species arrived less than five years ago, it has become one of the most common insects, reported as “everywhere, invading cars, houses, and workplaces”.

**British Columbia***: provided by Lorraine Maclauchlan, BC Minitsry of Forests; presented by Imre Otvos, Canadian Forest Service*

Douglas-fir tussock moth, *Orgyia pseudotsugata*
Near Vernon: <100 ha DFTM defoliation. Population collapsed; virus was present in the population.

Western spruce budworm, *Choristoneura occidentalis*
Kamloops Region: 100,936 ha of Western spruce budworm (WSBW) defoliation, primarily in the south near Princeton. This is a substantial increase from 2004.
Cariboo Region: Leo estimates WSBW defoliation to be ~600,000 ha (about the same as in 2004).

*Spray Programs against Western spruce budworm using B.t.k.:*
2005: 2.4 L/ha *B.t.k.* (Foray 48B)
Cariboo: 28,985 ha (using 2 lama’s, hiller’s; Western Aerial Applications)
Near Princeton: 2,387 ha (using a lama; WAA)
2006: Plans to treat ± 30,000 ha
± 25,000 in the Cariboo
~8,000 ha in the south part of the Kamloops Region

Western Hemlock looper, *Lambdina fiscellaria lugubrosa*
Columbia/Arrow Boundary Districts: 6,827 ha of WHL defoliation. Population has collapsed.

Larch casebearer, *Coleophora laricella*
Very small patches of larch casebearer defoliation in the Kootenys.

Other Defoliators
Very minor evidence of 2-year cycle budworm.
Various other miscellaneous deciduous defoliators were present.

## Project and Individual Reports:

### Western Spruce Budworm

*Western Spruce Budworm Defoliation on Emigrant Creek Ranger District, Malheur National Forest: Defoliation Prediction from Pheromone Trap Catches by: Donald W. Scott and Lia H. Spiegel; Blue Mountains Pest Management Service Center. La Grande, Oregon. October 19, 2005*

Over the past several years, western spruce budworm (*Choristoneura occidentalis*) populations have been increasing in the southern Blue Mountains in northeastern Oregon, primarily on the Emigrant Creek Ranger District, Malheur National Forest. Defoliated areas have been mapped annually during the Aerial Detection Survey since about 2000, and the acres with defoliation have steadily increased each year. The Blue Mountains Pest Management Service Center, in conjunction with the Emigrant Creek Ranger District, began monitoring these populations in 2003 using lower crown sampling of larvae and pheromone trapping of adults to develop population trends.

To provide resource managers with data that are easy to understand, we converted pheromone trap catch data to percent of defoliation on host trees (white fir and Douglas-fir) for three areas on the Emigrant Creek Ranger District where budworm defoliation was occurring: King Mountain, Calamity, and Van. We used the technique described by Niwa and Overhulser (see publications) to convert numbers of moths captured in pheromone traps to predicted percent defoliation of new foliage in the subsequent year. While Niwa and Overhulser specified a range of moth catches for defoliation levels in 20% increments, we created a regression that provided a one to one correspondence between a given trap catch number and percent predicted defoliation. This enabled us to compare actual defoliation estimates of different increments with predicted defoliation estimates. We obtained estimates of actual defoliation for 2005 by making ocular estimates of average percent defoliation of current-year foliage on the five host trees nearest to the location of each trap.

Trapping results from 2004 were used to predict defoliation for 2005; and trapping results from 2005 were used to predict defoliation for 2006. The trap catch data for 2004 predicted a defoliation level that was within 3 percent of the actual defoliation (ocular estimate) in 2005 for the King Mountain site, and within 4 percent of the actual defoliation for the Van site.

Trapping results from 2005 predict an increase in 2006 defoliation by 5 percent for the King Mountain site (from 1 to 6%) over the actual defoliation in 2005. The Calamity site defoliation is predicted to increase by 32 percent (from 0.4 to 32%) over the actual defoliation in 2005. And the Van site defoliation is predicted to increase by 37 percent (from 32 to 69%) over the actual defoliation estimated for 2005.

We will continue to follow these trends for these three areas in 2006.

*Western Spruce Budworm and Hemlock, is this a new forest health threat?*
*Carol Randall, Forest Entomologist R1 Coeur d'Alene, ID*

Background:

- 2002 received reports of defoliation occurring on western Hemlock on Priest Lake RD, IPNF and along Lightening Creek north of Clark Fork, ID.
- Usually hemlock defoliation caused by sawflies, western blackheaded budworm, western hemlock looper, or western false hemlock looper.
- We had a historical report of western spruce budworm (WSBW) causing extensive defoliation of hemlock in this area from 1922. No reports of this type of defoliation by WSBW in hemlock since.

Field Findings:

- Sawfly and spruce budworm (*Choristoneura* species) larvae were found during lower crown sampling in 2002. Budworm larvae were more prevalent.
- Sent samples of budworm larvae to U of I for identification to confirm *Choristoneura* identification in 2002, 2003, and 2004- we found multiple species of *Choristoneura*- not just western spruce budworm (*C. occidentalis*), though WSBW was the most prevalent.

Aerial Survey Results:

| ADS Year | Acres Defoliated |
|---|---|
| 2002 | 7,200 (first year visible defoliation) |
| 2003 | 18,400 |
| 2004 | 51,200 |
| 2005 | To be Determined |

Permanent Plot Findings:

- Established permanent plots in 6 defoliated areas- 1 set in 2002, other 5 in 2003.
- Defoliation concentrated in tops of trees, especially first year of visible defoliation
- Severity of defoliation fluctuates between plot areas.
- Very few trees experiencing 100% mortality in any crown 3rd.
- Lightening Creek Plot Area- 4 years of defoliation data:
  - Average Top 1/3rd Crown Defoliation Ratings: 2002= 2.8; 2003= 4.7; 2004= 2.5; 2005= 1.4.
  - Declining defoliation trend, approximately 52% of hemlock in plots had some top kill in 2005.
- Priest Lake Plot Areas (5)- 3 years defoliation data:
  - Average Top 1/3rd Crown Defoliation Rating: 2003= 2.8; 2004= 3.3; 2005= 2.1.
  - Declining defoliation trend; % of hemlock in plots with top kill varied by plot area from 0 to 34%

2006 Predictions:

- Declining populations in permanent plot areas likely to result in less defoliation in these areas in 2006.
- Preliminary data from aerial survey shows WSBW defoliation increasing in area south of permanent plot areas. Not clear what trend is in new areas.

**Douglas-fir Tussock Moth**

*Virus Report: Imre Otvos*

Under the Coop Agreement, my group is continuing to maintain the Goose Lake strain of the Douglas-fir tussock moth (DFTM) in laboratory culture.

In addition, we also conducted a survey of genotypic variation of the Douglas-fir tussock moth virus, based on the larvae we reared from egg masses (EM) sent to us between 1999-2001 from the states of California, Washington, Oregon and Idaho by the USDA Forest Service and State Agencies for Washington and Idaho (Table 1).

Table 1. Egg masses collected from various locations in the United States and sent to PFC for determination of virus incidence and percent egg parasitism.[1]

| YEAR COLL. | STATE | NO. LOCATIONS | NO. REARED | REARING DATE (@ PFC) | % | |
|---|---|---|---|---|---|---|
| | | | | | VIRUS | PARA |
| **Jan., 1999** | CA | 5 sites Sequoia & Kings Canyon National Parks | 245 | April, 1999 | 21.9 (16.4 – 33.5) | 0.0 |
| ***Fall, 1999*** | ID | 11 sites (only 4 sites had sufficient no. of EM) | 48 | Spring, 2000 | 0.0 | 0.1 (0.0 – 0.3) |
| ***Fall, 1999*** | OR | 4 sites | 60 | Spring, 2000 | 0.9 (0.0 – 1.4) | 0.1 (0.0 – 0.1) |
| Fall, 2000 | ID | 4 sites | 145 | Spring, 2001 | 0.4 (0.0 – 0.9) | 0.4 (0.1 – 1.0) |
| Fall, 2000 | OR | 9 sites (only 2 sites had sufficient no. of EM) | 23 | Spring, 2001 | 0.8 (0.5 – 1.3) | 0.1 (0.0 – 0.4) |
| Fall, 2000 | WA | 2 sites | 45 | Spring, 2001 | 14.4 (12.6 – 17.4) | 5.4 (5.3 – 5.7) |
| Fall, 2001 | ID | 5 zones (24 misc. sites) | 43 | May, 2002 | 0.6 (0.0 – 6.4) | 2.9 (2.1 – 3.7) |
| Fall, 2001 | WA | 4 sites | 59 | May, 2002 | 0.3 (0.0 – 0.9) | 0.3 (0.0 – 0.9) |

For the incidence of virus determination we followed the method described by Stelzer (1979). This involved rearing 25 larvae for 2 weeks from each of 50 egg masses, if

[1] This table may be useful to people new to DFTM.

available, and making microscope slides smears from the dead larvae that were then examined for the presence of polyhedral inclusion bodies (PIBs) under compound microscope. The cadavers were saved and the viral DNA was extracted according to the method described by Williams and Otvos (2005). The most interesting result was that there were more sites with single-embedded viral PIBs (*Op*SNPV) in the U.S., the multi-embedded PIBs (*Op*MNPV) were more commonly found in B.C.

In 2005, we received virus-killed dead DFTM larvae from New Mexico. This was the first time that virus-killed larvae were observed and collected in New Mexico, thanks to Terry Rogers. Viral DNA will be extracted from these larvae to determine if the virus is a New Mexico strain or whether it spread from the adjacent valley that was treated with TM Biocontrol-1 in the 1970's.

DFTM egg masses from New Mexico and more recently, from Idaho have been received. New Mexico egg masses were collected from 2 locations, from the east (23) and west (77) sides of the Sandia Mountains, for a total of 100 egg masses. Idaho egg masses were collected from the southeastern corner of the State, at 6 locations in Pleasant View Hills (all within a 6 mile distance), about 10 miles west of Malad City. A total of 158 egg masses were collected. We may also receive egg masses from the new, increasing population in California.

To determine incidence of viral infection and percent parasitism for one location (based on rearing 50 egg masses), the cost is about $2,700 for supplies and labor. The process is labor intensive and time consuming as 25 larvae are reared from each of the 50 egg masses for 2 weeks, smears are mad of the dead larvae, and then are examined under a compound microscope for the presence of PIBs. If only 25 to 30 egg masses are collected from each site, these can still be used to determine virus incidence and egg parasitism, and the cost of determining the level of naturally occurring virus and egg parasitism would be about $1,350.

A subsample of 50-100 eggs is reared individually from each egg mass to determine parasitism. There are two main egg parasitoids of the DFTM: *Telenomus* and *Trichogramma*. Only one adult *Telenomus* emerges from a single egg. To further complicate determination of egg parasitism, *Trichogramma* emerge before larval hatch and are capapble of parasitizing the unparasitized DFTM eggs in the same egg mass. This ability of the *Trichogramma* makes it mandatory to rear the DFTM eggs individually for accurate determination of percent parasitism.

We have been working on the development of a virus detection kit that could be used in the field that would reduce this high cost of the currently used method of virus determination and would allow virus detection in live larvae or egg masses in the field as they are collected.

*Progress on the development of a virus detection kit for use in the field*

An integral part of the pest management system developed for the Douglas-fir tussock moth (DFTM) involves monitoring the incidence of the virus in field populations of DFTM (Shepherd et al., 1984; Otvos et al., 1987). The current monitoring system requires collecting egg masses from the field, cold treating them for 3½ to 4 months to break diapause [if the egg masses were collected before temperatures dropped to 5°C (41°F) at night in the field], larval hatch usually occurs 10-12 days later after the eggs were placed into rearing. Twenty-five larvae are reared from each of the 50 EM for 2 weeks, then smearing is made of the dead larvae that are examined microscopically for the presence of virus particles (polyhedral inclusion bodies or PIBs) (Stelzer, 1979). This method cannot accurately detect virus at concentrations lower than $10^6$ PIBs (Kaupp and Ebling, 1993). The aim of the virus detection kit project was to develop one or more methods for detecting the DFTM virus (*Op*NPV).

We developed an ELISA system that permits detection of *Op*NPV (in larvae) that is specific both to the single (*Op*SNPV) and multiple-occluded (*Op*MNPV) varieties of the virus. The ELISA system cannot detect fewer than 835 purified PIBs. We also developed a modified ELISA system to detect *Op*MNPV contamination on the surfaces of artificially seeded DFTM EM. We found that the ELISA system cannot detect virus when there are fewer than 5,000 PIBs (in unpurified "slurry" made by "washing" the egg-mass), which is similar in sensitivity to the method currently used (counting stained PIBs using a compound microscope). However, the new ELISA system has the advantage of providing quantifiable data months in advance of the currently used method. At present, we do not know how many PIBs are on one field collected EM. It would be highly desirable to determine this by "washing" field collected DFTM egg masses, then counting the PIBs. We would be happy to receive financial contributions for this work.

We also developed a second antibody-based detection system (dipstick method) that can be used for on-site evaluation of virus incidence. However, this method is only sensitive enough to detect 5,350 *Op*MNPV PIBs in a sample. But the dipstick method is capable of detecting virus in infected larvae, without purification of the test sample. It is hoped that he system can be futher developed to be semi-quantitative (when known samples or visual charts are provided to the end user). The dipstick method is not as sensitive as the ELISA system; however, the dipstick method requires only 2 hours for the analysis of test samples, and is applicable for on-site field analysis.

We plan to develop a third method, a lateral-flow system, which is designed for on-site diagnosis and would take less than 2 hours to perform the analysis.

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*Mating disruption*

Two additional areas of future work were discussed. In 2001, a mating disruption project, using DFTM pheromone in the Hercon flake was conducted. Although results looked effective it was difficult to tell because the populations in part of the treatment blocks collapsed and some of the remaining treatment and control blocks were either harvested or treated with B.t the following year. If there are potential DFTM outbreaks in the near future, we would like the option of continuing to test the mating disruption.

*Low dose virus discussion*

In addition, currently there are about 280,000 acre doses of the DFTM virus in cold storage in Corvallis. At the present there are no plans to produce more virus, and if there were it would take several years for a production facility to get up to speed. An additional study that could be done on emerging DFTM outbreaks is to test lower doses of virus. The question: since the effectiveness of the virus, is, in part, dependant on the virus spreading in the population – 1$^{st}$ wave and 2$^{nd}$ wave of infection – could we apply a lower rate or dose of virus and achieve the same result. If this could work, then applying lower doses of the virus would extend the current amount of available virus.

*Trap locations*

There was also a discussion that each region should re-evaluate their existing DFTM EWS trap sites to make sure trap plots are still appropriately located. The discussion also included moving trap plots so they are located in specific value versus general forest – or in keeping a mix.

**Asian Gypsy Moth Project in Idaho –** *Gretchen Lech, IDL*
In 2004, one male Asian gypsy moth (AGM) was captured in Idaho. The moth was caught in a detection trap in North Idaho near Hauser Lake, in Kootenai County. The site is approximately 1.5 miles east of the Washington/ Idaho state border, and the area is comprised mainly of unused agricultural fields. North of the site, there are deciduous trees in a mobile home park, cottonwoods along a riparian area, and conifers, including larch. The specific route of introduction in this case has not been located, however many potential routes were assessed, including a railroad line running along the capture site.

Potential Host Plant Species Survey- In October of 2004, the USFS R-1 assisted the Idaho Department of Lands in conducting a survey of potential host plants in the area surrounding the capture site. It was determined that there were adequate host plants to potentially support a gypsy moth population.

Life Stage Survey- In October and November of 2004, an intensive survey was conducted in the area surrounding the AGM capture site for evidence of gypsy moth life stages. This survey was negative.

A Science Panel, convened by APHIS, reviewed the results of the life stage survey, host plant species survey, potential introduction routes, and local area characteristics. The panel recommended delimitation trapping in 2005 combined with an aerial spray treatment in the spring.

Local area landowners and residents were notified of the life stage survey and upcoming delimitation trapping, and a public information meeting was held in February 2005 to explain the aerial application process and importance.

Aerial Spray- In 2005, the Idaho Department of Lands in cooperation with USDA-Animal and Plant Health Inspection Service (APHIS) implemented plans to ensure that no Asian Gypsy Moths remained in north Idaho. A 600 acre area surrounding the 2004 capture site of one male AGM near Hauser, Idaho was sprayed with Foray 48B (*Bacillus thuringiensis* var. *kurstaki*) insecticide. The insecticide was applied at 64 oz., neat (24 BIU) per acre. The spray project consisted of three aerial applications applied 7-10 days apart. Spray dates were: May 12, May 21, and May 28, 2005.

Delimitation Trapping – Delimitation traps were placed at a density of 25 traps/ $mi^2$ (first 2 mile radius) and 16 traps/ $mi^2$ (next 3 mile radius) surrounding the 2004 capture site of one male Asian Gypsy Moth near Hauser, Idaho. 1441 traps were placed prior to July 1, 2005, checked every 2 weeks during the summer, and removed the end of September. No gypsy moths were captured in the delimit area. In addition, Washington State conducted delimit trapping to complete the 5-mile radius surrounding the capture site.

2006 Season: Delimitation trapping will be conducted for the second season in a 5 mi radius surrounding the 2004 capture site. The density will be 25 traps/ $mi^2$ for the first 2 mi radius, then 16 traps/ $mi^2$ for the next 3 mi radius. After the 2006 season, the Science Panel will determine whether additional delimit trapping is needed

**Balsam Woolly Adelgid** – *Dave Overhulser, ODF*

Detecting Balsam Woolly Adelgid (BWA) Infestations in Subalpine Fir Stands Using Lichen Cover – Preliminary Results. David L. Overhulser – Oregon Department of Forestry

For almost half a century aerial surveyors in Oregon have used fading foliage in true fir as the primary indicator for infestations by the balsam woolly adelgid (BWA). Using the fading foliage signature, very few acres of BWA damage were mapped in Oregon since the early 1970's. In contrast, recent roadside ground surveys have indicated that BWA infestations have in fact spread into many host stands in eastern Oregon and are causing significant damage not detected by aerial surveys prior to 2000. The fading foliage signature for BWA infestations was clearly not working.

In 2000, aerial surveyors in Oregon started using the black color in subalpine fir stands as the only BWA signature. This black coloration was later found to be associated with lichen cover on dead and declining trees. Using the black coloration of trees as a BWA signature, the acres of BWA damage mapped in Oregon has increased to levels not seen in more than three decades. In 2004, ground crews sampled nine polygons drawn during the 2003 survey using the black tree signature. All of the 2003 survey polygons visited contained BWA hosts and damage. The lichen signature was more pronounced in subalpine fir than the other tree species present in these high elevation mixed conifer stands. The prominent lichens from subalpine fir in these polygons were species of *Bryoria*. It appears visible *Bryoria* cover is a living signature for dead and declining subalpine fir associated with BWA infestations. This signature can be used by both aerial observers and ground personnel to identify BWA infestations. Because lichen cover, unlike fading foliage, is always present, it provides a stable signature during the times aerial or ground surveys are normally conducted.

**Hemlock Woolly Adelgid** – *Dave Overhulser*

Predators of the Hemlock Woolly Adelgid and Balsam Woolly Adelgid (Homoptera: Adelgidae) in the Pacific Northwest.

The main objective of this project is to identify potential predators associated with hemlock woolly adelgid (HWA) infested western hemlock. A secondary objective is to determine whether or not similar predator suites are associated with balsam woolly adelgid (BWA) infested firs and Cooley's adelgid infested spruce and Douglas fir. One hundred and thirty-two mature western hemlocks representing both ornamental and seed orchard trees that are infested with HWA are being surveyed by beat sampling for potential insect predators every 4 to 6 weeks over two years. Fourteen uninfested trees are included as controls. Sampling began in January 2005. Trees are located at 17 sites in northwest Oregon and western Washington across a range of latitudes. Two BWA infested grand firs, two Cooley's adelgid infested spruce, and three Cooley's adelgid infested Douglas firs at four sites are being surveyed monthly beginning September 2005.

As of October 2005, 88 insect families have been collected, of which 33 may include predatory genera. The most abundant predators so far are from the Derodontidae and Coccinellidae. Specimens from 17 families of Hymenoptera that include parasites have also been collected. Potentially predatory or parasitic specimens are currently being determined by taxonomists.

**Amber Birch Leaf Miner** – *Jim Kruse*

USFS Forest Health Protection Working With Partners to Stop an Exotic Pest

The amber-marked birch leaf miner, *Profenusa thomsoni* (Konow), has recently become one of the most common insect pests affecting native and ornamental birch trees (*Betula* spp.) in south-central and interior Alaska. Birch leaf miners were introduced from Europe to North America in the early 1900s and have since become established throughout many parts of the northern U.S. and Canada. The first damage to birch was noticed in Anchorage in 1996, and by 2004, birch defoliation in the Anchorage Bowl extended over 138,000 acres. Leaf miner larvae feed between the leaf surfaces in the mesophyll, creating blotch-like mines. Damage is thought to be mainly aesthetic, rarely killing plants. However, the annual destruction of photosynthetic capacity may have long-term impacts on tree health.

In an effort to establish a long term control of this exotic insect in Alaska, a cooperative biological control program was initiated in 2002 with the following partners: USDA Forest Service; USDA Animal and Plant Health Inspection Service (APHIS); State of Alaska Division of Forestry, Canadian Forestry Service, and the University of Alberta. Small numbers of the ichneumonid parasitoids (*Lathrolestes luteolator*) were collected in Canada, and released in Anchorage (55 in 2004 and 158 in 2005). While these numbers are small, the figure for 2005 approaches the numbers released in Edmonton, which resulted in control in only a few years. Additional parasitoid releases are planned for Anchorage in years to come, the intent of which is to establish populations of the parasitoid that will eventually reduce the leaf miner populations to endemic levels. Future work, including establishing permanent photo points and involving additional students, cooperators, and technicians, will help determine and track the effects that the parasitoid is having on the leaf miner population.

**New or Pending Publications**:

New

Cook, S.; J. Wenz; I. Ragenovich; R. Reardon; and C. Randall. 2005. Impact of mating disruption pheromone treatments to control Douglas-fir tussock moth, *Orgyia pseudotsugata* (McDunnough) (Lepidoptera:Lymantriidae) on egg parasitoids. Pan Pacif. Entomol. 81:41-46.

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Otvos, I. S., B. Kukan, R. Reardon, and I. Ragenovich. In press. Effects of Long-term storage on potency of TM-Biocontrol-1, the registered viral insecticide of Orgyia pseudotsugata (Lepidoptera:Lymantriidae). J. of Econ. Entomol. 98(6):000-000

Pending

Niwa, Christine G. and David L. Overhulser. In draft. Monitoring western spruce budworm with pheromone-baited sticky traps to predict subsequent defoliation.

Azuma and Overhulser. Pending. Effects of western spruce budworm defoliation on private timberlands in Oregon.

Ragenovich and Mitchel. Pending. Revision of Forest Insect and Disease Leaflet 118 – Balsam Woolly Adelgid.

Kruse, James. Pending. Tortricid moths of Alaska.

Goheen, Ellen and Beth Willhite. Pending. Field guide for forest insects and diseases of the Pacific Northwest.

xxx.xxx Insects of Southern Alaska.

Duncan, R. Picture guide of defoliators in British Columbia.

**Western North American Defoliator Working Group Meeting Attendees**
**Coeur d' Alene, ID**
**October 29-30, 2005**

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